

### **Remarks and Arguments**

The drawings were objected to by the examiner for failing to label Figures 3A, 3B and 3C as "prior art." Corrected drawings are therefore being submitted herewith which now include those labels. Reconsideration of this ground for objection is respectfully requested.

The specification was objected to for failing to show the angle "d" in the drawings. Applicants have addressed this objection by taking the examiner's suggestion to remove the term "d" from the corresponding point in the specification by amendment. Reconsideration of the specification under this ground for objection is respectfully requested.

Claims 7 and 14-17 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. In particular, the examiner has noted that the term "detector" appears in Claim 2, Claim 7 and Claim 14, and that the relative dependency between these claims makes it unclear whether any of these detectors are the same from one claim to the next. Claims 7 and 14 have been amended herein to depend directly from Claim 1, thereby obviating this basis for rejection. Reconsideration of Claims 7 and 14-17 under this ground for rejection is respectfully requested.

Claims 1-5 were rejected under 35 U.S.C. § 102(e) as being anticipated by published U.S. Patent Application Publication No. US 2003/0026301 ("Pianciola"). In making this rejection, the examiner has stated that Pianciola includes all of the features recited in the rejected claims, including a "waveguide wavelength locker." However, a review of the Pianciola reference reveals that there are distinct differences between it and the present invention.

Pianciola discloses a wavelength locker that uses a sample of light from a laser source (411) and splits it between two separate pathways ( $U_{s1}$  and  $U_{s2}$ ). The light in each of these pathways passes through its own filter element ( $FP_1$  and  $FP_2$ , respectively). The outputs from the filters are input to opto-electronic device 6, which

has two photodiodes, each receiving a different one of the two signals. A comparator device is used to compare the two photodiode signals and determine when a wavelength shift in the laser light has occurred. Since each of the filters has a unique narrow response to a different side of the laser center wavelength, shifts in the laser wavelength may be detected.

While the present invention also teaches a wavelength locker, it is unlike that of Pianciola. Applicants' wavelength locker uses frequency discriminating elements that are all integrated in a planar waveguide substrate. For example, the embodiment of Figure 7 has a planar waveguide with a passive coupler splitting an input signal between three paths. In the first path is a Mach-Zender interferometer, in the second is a grating that provides a wavelength reference value, and the third path is a simple waveguide that allows the power to be monitored and normalized. The outputs from these three paths are coupled to detectors that may be monitored by a controller to determine as changes arise. However, by forming the device in a planar waveguide, the alignment between the components does not change, thereby preventing fluctuations and instabilities that might otherwise occur. In addition, the use of a planar waveguide allows very high levels of functionality, as most of the necessary components can be fabricated in the same substrate.

Applicant's independent Claim 1 has been amended to more clearly point out the planar waveguide nature of the wavelength locker structure. Whereas the claim previously referred to a "waveguide wavelength locker," as amended, the claim recites "a wavelength locker fabricated from a planar waveguide." Even a brief review of Pianciola makes it clear that the wavelength locker disclosed therein uses discrete components such as optical fibers and discrete Fabry-Perot filters. Nowhere in Pianciola is there any suggestion of constructing a wavelength locker on a planar waveguide substrate. Claims 2-5 depend from Claim 1 and are equally unsuggested by the cited prior art. Reconsideration of Claims 1-5 under this ground for rejection is respectfully requested.

Claim 7 was rejected under 35 U.S.C. § 103(a) as being obvious over Pianciola in view of U.S. Patent No. 6,088,147 ("Weber"). Pianciola was apparently cited for the same reasons as discussed above. To this, the examiner adds the Weber reference, and argues that Weber "teaches an optical transmission system where an asymmetric Mach-Zender interferometer is used to modulate the output of the system." Indeed, the examiner is correct that Weber discloses the use of a Mach-Zender interferometer. However, Weber is unrelated to wavelength locking. Moreover, the combination of Pianciola and Weber still fails to disclose the claimed features of applicants' Claim 7. Claim 7 depends from Claim 1, and therefore includes all of the limitations of Claim 1 discussed above. There is simply no suggestion in the combination of Pianciola and Weber of a wavelength locker that is configured on a planar waveguide substrate. Reconsideration of Claim 7 under this ground for rejection is respectfully requested.

Claim 13 was rejected under 35 U.S.C. 103(a) as being obvious over Pianciola taken alone. The Pianciola reference is discussed in detail above, as is applicants' Claim 1, from which Claim 13 depends. Since Claim 13 inherits all the limitations of Claim 1, Claim 13 is likewise unsuggested by the Pianciola references for the reasons provided above. Reconsideration of Claim 13 under this ground for rejection is respectfully requested.

Claims 14-17 and 29-35 were rejected under 35 U.S.C. § 103(a) as being obvious over Pianciola and Weber in view of U.S. Patent No. 6,212,323 ("Harpin"). Pianciola and Weber are cited hereunder for the same reasons as provided above. To this combination, the examiner adds the Harpin reference, stating that "Harpin teaches a system where a plurality of Mach-Zender interferometers having different arm asymmetries is utilized" and that "Harpin teaches that the arm asymmetries lead to interference that can be used for wavelength selection." However, like Weber, Harpin is unrelated to the field of wavelength locking. In Figure 4, which is referenced by the examiner, Harpin shows an arrayed waveguide grating that has multiple paths with different lengths, the entire structure operating as an interferometer. However, there is no suggestion of a wavelength locker, much less one having the features recited in

applicants' claims. Claims 14-17 each depend ultimately from Claim 1, and each therefore inherits all the limitations of that parent claim. There is simply no suggestion in the cited prior art combination of a wavelength locker fabricated in a planar waveguide. Claim 29 is similar to Claim 1, but is limited to reciting just the wavelength locker. Like Claim 1, Claim 29 has been amended to clarify the subject matter of the claim, and it now refers to a splitter and two Mach-Zender interferometers (having different arm asymmetries), where all of the components are fabricated in a planar waveguide. There is no suggestion whatsoever of such a structure in the cited prior art combination. Claims 30-35 each depend ultimately from Claim 29 and are therefore equally unsuggested by the cited prior art. Reconsideration of Claims 14-17 and 29-35 is respectfully requested.

Some additional amendments to the dependent claims remaining in the application have been made to agree with amendments made to the independent claims from which they depend, respectively. Acceptance of these amendments is respectfully requested.

In light of the foregoing amendments and remarks, it is respectfully requested that all the claims be allowed such that the application may be passed to issue. If it is believed that a telephone conference will help expedite prosecution of the application, the examiner is invited to call the undersigned. The Commissioner is hereby authorized to charge any fees due for the filing of this paper to applicants' attorneys' Deposit Account No. 02-3038.

Respectfully submitted

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### **Amendments to the Drawings**

The attached sheet of drawings includes changes to Figures 3A, 3B and 3C. In particular, the label "PRIOR ART" has been added to each of these figures. The reason for these amendments is discussed in the remarks below. The attached sheet, which includes Figures 3A, 3B and 3C, replaces the original drawing sheet, which also includes Figures 3A, 3B and 3C.

Attachment: replacement sheet